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(56) Documents Cited  
**EP 0875555 A1** **EP 0758017 A1**  
**WO 1987/004143 A1**

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(54) Abstract Title

**Thickened aqueous compositions**

(57) The invention relates to thickened aqueous compositions which contain xanthan gum and at least one water softening agent. The water softening agent may be a water-soluble polyacrylate.

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Thickened Aqueous Compositions

The invention relates to thickened aqueous compositions which contain xanthan gum and at least one  
5 water softening agent.

We have found that xanthan gum can form a thickened stable gel for water softening agents which is stable and performs well. In screening for an appropriate gel system  
10 for water softening agent(s) we found that many known systems were not stable or left residues on dark cloths after washing.

Therefore we present as a feature of the invention  
15 an aqueous thickened composition comprising

- a) at least one water softening agent;
- b) water; and
- c) less than 1.0 %wt of a xanthan gum.

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Xanthan gum is an acidic, anionic, extracellular heteropolysaccharide, secreted from X.campestris. The polysaccharide is thought to act as a protective slime, essential for the pathogenecity of the micro-organism  
25 towards its plant host (Rutabaga plant) by blocking fluid flow through the xylem.

Xanthan gum is produced by bacterial fermentation and was the first polysaccharide produced on large scale  
30 using X.campestris. Such a technique offers the advantage of reproducible physical and chemical properties, with a stable cost and supply. Nevertheless,

unlike other microbial extracellular polysaccharides, the composition of the polymer varies with the Xanthomonas strain and culture conditions and in the presence or absence of pyruvate and/or acetate substituents.

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The polysaccharide forms highly viscous solutions at low polymer concentrations, which are atypically insensitive to a wide range of salt concentration, pH and temperature. In addition to this, Xanthan solutions exhibit strong shear thinning behaviour showing non-Newtonian behaviour, a measurable yield stress from about 1% polymer concentration, emulsion stabilising and particle suspending abilities, which are all indicative of intermolecular associations.

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This natural polysaccharide is widely used in the food industry and to a lesser extent the pharmaceutical industry. Most of the commercial Xanthan samples contain a variable amount of  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$  salts, and approximately 30-40% pyruvate content with 60-70% acetate content (although this is subject to variability).

The amount of water softening agent or a mixture thereof in the composition is between 0.1 to 70% wt, ideally, 3 to 50% wt, preferably 15 to 35% wt. Preferably the water softening agent is a water-soluble water softening agent, which is organic or inorganic, and preferably is a combination of two or more agents. Inorganic water-soluble water softening agent which may be present include alkali metal (generally sodium) carbonate; while organic water-soluble water softening agent which may be present include polycarboxylate

polymers, such as polyacrylates, acrylic/maleic copolymers, and acrylic phosphonates, monomeric polycarboxylates such as citrates, gluconates, oxydisuccinates, glycerol mono- di- and trisuccinates, 5 carboxymethyloxysuccinates, carboxymethyloxymalonates, dipicolinates and hydroxyethyliminodiacetates. Plus sequestering agents like phosphonates, iminodisuccinates, polyaspartic acids. Salts of citric acid, radical scavengers, such as BHT, phosphonate stabilisers such as, 10 diethylenetriaminepenta (methylene phosphonic acid) and its corresponding pentasodium salt, available under the trade names Dequest 2060 and Dequest 2066, DTPMP and DTPMA (Dequest 2010) respectively, from Monsanto Chemical Co.

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Preferably the water-soluble water softening agent is a water-soluble polymer which is Polyacrylate, MW: 4000-8000 such as is available Accusol 445 (Rohm & Haas) (CAS REG Nr. 66019-18-9). Ideally the water-soluble polymer is 20 only partly neutralised.

The remaining part of the formulating can be water, with up to 95%w/w of the formulation be water.

25 Organic solvents may optionally be added but are not essential in the present invention and can be any water-miscible organic solvent. Suitable solvents include C3 - C12 alkyl glycol ethers and C1-C4alcohols, such as methanol, ethanol and isopropanol . More preferably, the 30 solvent is selected from the group consisting of EGBE, ethylene glycol hexyl ether ("EGHE") and mixtures thereof. The solvent is typically present in an amount

from about 0.5% to about 4.0%, preferably from about 0.75% to about 2.5%, and most preferably from about 1.0% to about 2.0% by weight of the composition. EGBE is available from Union Carbide under the trade name Butyl Cellosolve. EGHE is available under the trade name Hexyl Cellosolve from Union Carbide.

The pH, as defined in the present context, is measured in the neat compositions at 20°C. For optimum stability of these compositions, the neat pH, measured in the above-mentioned conditions, must be in the range of from 3 to 7, ideally from 4 to 6, especially 5.1 to 5.7. The pH of these compositions herein can be regulated by the addition of a Bronsted acid or base.

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Xanthan gum is a water-soluble polymer. It is soluble in hot and cold water, as well as being stable in acidic and alkaline conditions (pH 1.5-13). The solubility of Xanthan gum allows highly viscous solutions at low concentrations, i.e., a 1% solution has a viscosity of 800-1000cps (60rpm/LVF Brookfield viscometer). Preferred viscosities of solutions generated are 30 to 3000cps, preferably 500 to 2000cps, ideally 1000 to 1500cps.

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Preferred concentrations of xanthan gum are less than 1.00%wt, ideally less than 0.7%wt, preferably less than 0.5 %wt, and especially less than 0.4%wt. A preferred source of xanthan gum is Rhodopol T, CAS REG Nr. 11138-66-2 (company Rhodia).

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A preservative may be added such as 1-(3-Chloroallyl)-3,5,7-triaza-1-azoniaadamantane-chloride (CAS REG Nr. 004080-31-3), available as Dowcill 75, at up to 0.1%wt.

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### Stability

Initial viscosity: 1000-1400 cps (measured with a Brookfield LVF , spindle 2, 12 rpm @ 20 °C)

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The stytem was stable over a period of 3 months over a range of different conditions.

### Example

15

	<b>As 100% actives</b>
Dehardened Sterilized Water	to 100%
Sodium Citrate	10-20
Water softening polymer	2-10
Xanthan gum	0.1-1.0
Preservative - optional	0-0.1
Dye -optional	0-0.1
Perfume - optional	0-0.8

Claims

1. A thickened composition comprising
  - 5 a) at least one water softening agent;
  - b) water; and
  - c) less than 1.0 %wt of a xanthan gum.
2. A thickened composition as claimed in claim 1  
10 wherein at least one water softening agent is a water-soluble polymer.
3. A thickened composition as claimed in claim 1 or 2  
15 having 0.1 to 70% wt, preferably 15 to 35% wt of a water softening agent or a mixture thereof.
4. A thickened composition as claimed in claim 2  
wherein the water soluble polymer is a polyacrylate,  
preferably of Mw 4000-8000.  
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5. A thickened composition as claimed in claim 4 which additionally comprises citrate.
6. A thickened composition as claimed in claim 4 or 5  
25 which additionally comprises a phosphonate,  
preferably HEDP.



INVESTOR IN PEOPLE

Application No: GB 0121342.0  
Claims searched: 1 to 6

Examiner: Graham S. Lynch  
Date of search: 26 February 2002

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): None

Int Cl (Ed.7): None

Other: On-line : WPI, EPODOC, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0875555 A1 PROCTER & GAMBLE. Whole document.	1, 3.
A	EP 0758017 A1 PROCTER & GAMBLE. Whole document.	
A	WO 87/04143 A1 ABRADI. Whole document.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.